PAN-PACIFIC ENTOMOLOGIST
66(3): 232–240, (1990)

TWO NEW NORTH AMERICAN *COPRIS* MULLER, WITH NOTES ON OTHER SPECIES (COLEOPTERA: SCARABAEIDAE)

WILLIAM B. WARNER
2338 W. Rockwell Ct., Chandler, Arizona 85224

Abstract.—*Copris macclevei* NEW SPECIES (Arizona, New Mexico, Sonora) and *Copris igualensis* NEW SPECIES (Guerrero, Mexico) are described. Habitat preference and rodent inquiline habits of *Copris arizonensis* Schaeffer and *C. macclevei* are discussed, and bionomic information is given for *Copris lecontei* Matthews. The female of *Copris mexicanus* Matthews & Halffter is described for the first time.

Key Words.—Insecta, Coleoptera, Scarabaeidae, *Copris macclevei, Copris igualensis*

Except for the description of *Copris martinezi* Matthews & Halffter (1968), no additions have been made to the New World *Copris* Muller since Matthews (1962) revised the group 25 years ago. I describe two new species from Mexico and the southwestern United States, bringing the number of New World *Copris* species to 26. New information on the biology and distribution of some known species is also discussed, and the previously unknown female of *Copris mexicanus* Matthews & Halffter is described.

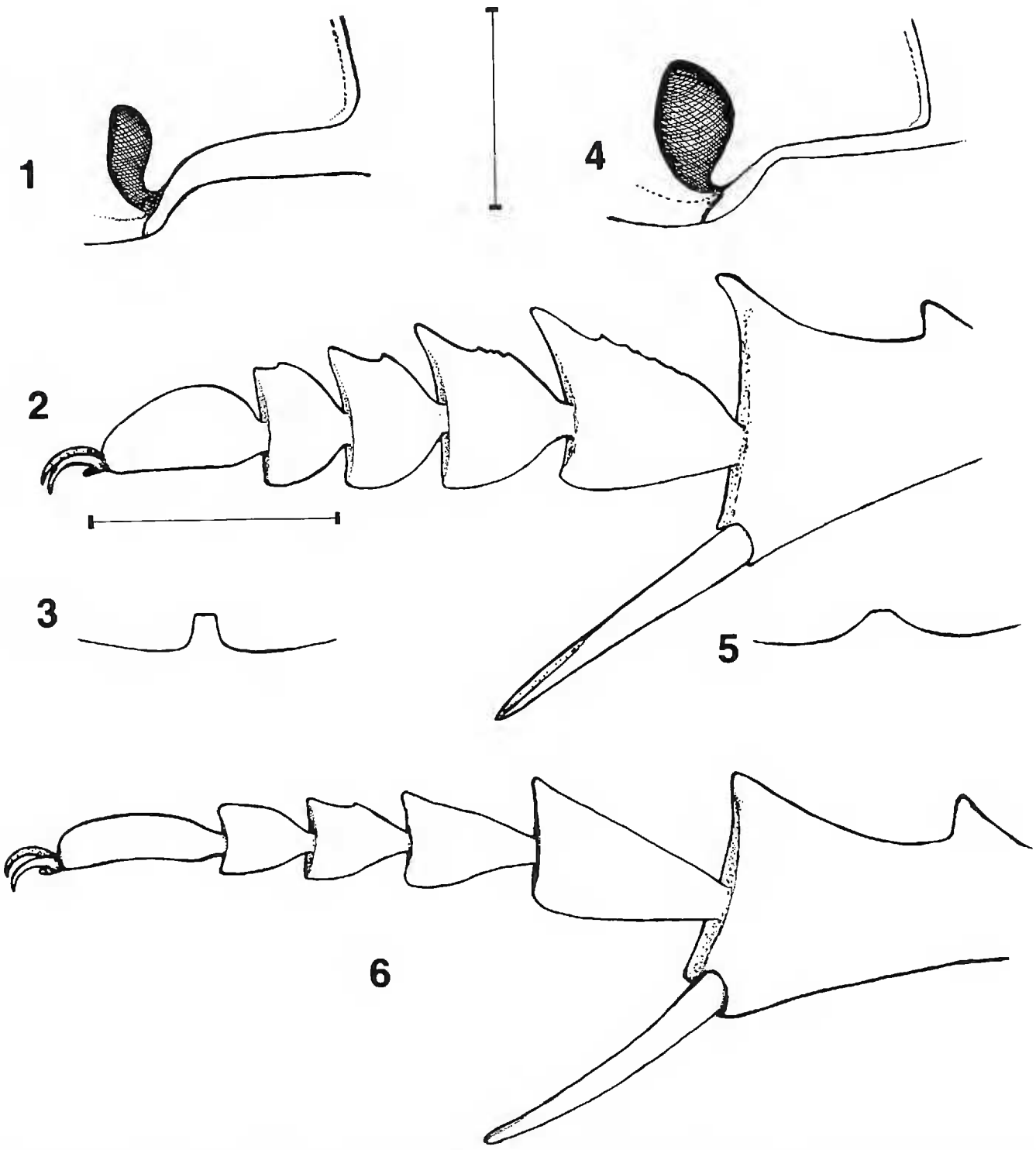
METHODS

Length and width measurements are to the nearest 0.5 mm. Length measurements are from tip of the clypeus to visible end of the pygidium; width measurements are given for the widest point (elytra in all cases) and across the elytral humeri. Directions for surfaces on legs are given as if the legs are extended in axes perpendicular to the longitudinal body axis (sensu Torre-Bueno 1978); the normally exposed (ventrally facing) faces of the hind femora are therefore anterior, and so forth. The terminology of Matthews (1962) is used for cephalic structures.

TAXONOMY

Copris macclevei Warner, NEW SPECIES
Figs. 1–3

Types.—Holotype, male and Allotype, female: Data. "AZ: Pima Co., 4 mi. S. Arivaca, Fraguita Wash, vii-10-1977, at light, S. McCleve"; deposited in the Florida State Collection of Arthropods, Gainesville. Paratypes, 190 (85 males, 105 females), data: same as primary types (23). ARIZONA. *PIMA Co.:* N end Coyote Mts, 11 Jul 1977, at light, S. McCleve (10); Florida Cyn, 9–11 Sep 1981, black light, K. Randall, J. May; Santa Rita Exper Range nr jct Proctor Ranch Rd & Madera Cyn Rd, 14 Aug 1973, R. W. Duff; same (14.5 km E Continental), 1 Jul 1989, ex active *Neotoma* nest, J. S. Hunter (7); same, 5 Aug 1988, parts of dead specimens ex nest of *Neotoma* sp, W. B. Warner; Green Valley, 13 Mar 1988, ex active *Neotoma* nest, J. S. Hunter III (7); same: 2 Apr 1988 (5), 2 Apr 1989 (4), 22 Apr 1988 (17), 7 May 1989 (6), 8 May 1988 (10), 22 May 1988 (11); same (except "at pool light," M. S. Hunter): 10 Jul 1989 (9), 12 Jul 1988 (2), 26



Figures 1–6. Figure 1. *Copris macclevei,* holotype, right eye (dorsal view). Figure 2. *Copris macclevei,* holotype, left posterior tarsus (posterior view). Figure 3. *Copris macclevei,* holotype, anterior prosternal margin (ventral view). Figure 4. *Copris lecontei,* right eye (dorsal view). Figure 5. *Copris lecontei,* anterior posternal margin (ventral view). Figure 6. *Copris lecontei,* left posterior tarsus (posterior view). Scale lines 1 mm; each figure pair (1 and 4, 2 and 6, 3 and 5) drawn to same scale.

Jul 1988, 28 Jul 1988, 4 Aug 1988; same (except J. S. Hunter III): 15 Jul 1989, 24 Jul 1988 (8), 2 Sep 1988; same, 3–5 Aug 1988, at store light, W. B. Warner; Santa Catalina Mts, mouth of Bear Cyn, 3 Jul 1961, light, Werner, Nutting (9); Sabino Cyn, 14 Jul 1973, F. Hovore; Tangerine Rd, N of Tucson, 21 Jul 1959, G. A. Samuelson; Baboquivari Mts, base of Baboquivari Pk, 1000 m, 19.3 km E of Topawa, 31 Jul 1988, blacklight, J. Beierl. *COCHISE Co.:* Dragoon Mts, Texas Pass, 19 Jul 1917, Wheeler; Peloncillo Mts, 53.1 km E of Douglas, 17 Jul 1973, at light, S. McCleve; same, 18 Jul 1974; Cottonwood Cyn, 53.1 km E of Douglas, 28 Jul 1976, at light, S. McCleve; Guadalupe Can, 1 Jul 1976, at light, S. McCleve; Portal, 1433 m, 12 Jul 1964, at light, J. M. Puckle, M. A. Mortenson, M. A. Cazier (3); same, 2 Aug 1964; same, 13 Sep 1960, H. F. Howden, ex pack rat nest

(adult in brood ball with head only showing); 1.6 km S of Portal, 1463 m, 15 Jul 1965, at light, J. H. & J. M. Davidson, M. A. Cazier; 4.8 km NW Portal, 11 Jul 1972, at light, S. McCleve; Douglas, 10 Sep 1970, F. Brewton; Dry Cyn, Sands Ranch, SE end Whetstone Mts, 10 Aug 1952, H. B. Leech, J. W. Green (2); Miller's Canyon, 26 Aug 1976, R. L. Aalbu. *SANTA CRUZ Co.:* Pena Blanca, 23 Jul 1977, UV black light, R. Wielgus; Pena Blanca, 16.1 km W Nogales, 1 Aug 1961, UV light, Werner, Nutting; Pajarito Mts, Pena Blanca Cyn, 1158 m, 30 Jul 1979, at light, S. McCleve; Pajarito Mts, Pena Blanca, lot 763, 29 Jul 1963, R. H. Arnett, Jr. & E. H. Van Tassell (2); Amado, 4–5 Jul 1986, at light, W. B. Warner; nr jct Peck Cyn Rd & hwy 19, 1 Aug 1976, R. W. Duff. *GRAHAM Co.:* 1.4 km along Rd to Marijilda Cyn from hwy 666, 1177 m, 3 Aug 1965, H. B. Leech. *PINAL Co.:* Boyce Thompson Arboretum, 13–19 Aug 1982, blacklight trap, K. Randall, J. May; same, 18–22 Aug 1982. *GILA Co.:* Globe, June 1930, D. K. Duncan; same, Jul 1921; same, Jul 1930 (4); same, 2 Jul 1935, F. H. Parker; same, 7 Jul 1957; same, 1097 m, 8 Jul 1949, mesquite-oak, at light, F. Werner, W. Nutting (2); same, 9 Jul 1945, Parker; same, 10–14 Jul, D. K. Duncan; same, 19 Jul 1933 (2); same, 21 Jul 1935; same, 8 Aug 1954, D. K. Duncan. MEXICO. *SONORA.* Alamos, 22 Feb 1963, P. H. Arnaud, Jr.; 24.1 km N of El Oasis, 26 May 1961, Howden & Martin, ex pack rat nest; 10.5 km S of Benjamin Hill, 6 Aug 1963, 20 W blacklite, E. Sleeper, W. Agnew, G. Noonan, P. Sullivan; hwy 16, 32.3 km E of Rio Yaqui, 917 m, 26 Jul 1987, UV light, S. McCleve (6). Deposited in the institutions and collections of those acknowledged, and in those of the Field Museum of Natural History, Chicago, Museum of Comparative Zoology, Cambridge, Texas A & M University, College Station, and the collections of G. Halffter, H. Howden, B. Ratcliffe, and W. B. Warner.

Description.—Male (holotype [major]). Length 13.5 mm; width 8.0 mm widest, 7.0 mm at humeri. HEAD armed, horn weakly recurved, apex weakly clavate; clypeus vaguely bidentate, teeth not prominent, broadly obtuse, inner margins forming shallow angular emargination without medial notch; clypeus and genae almost contiguously punctate dorsally near external margin, punctures simple, quickly becoming obsolete on disc; posterior genal angles slightly acute; posterior oblique carina sharp; occipital margin with transverse occipital groove obsolescent, tripartite; eyes small, narrow, maximum dorsal ocular width about one-fifth length of posterior genal margin; gular-submental junction arcuate. PRONOTUM armed, medial prominences sublaminar, weakly diverging, shallowly arcuate (anterior view) with arc opening laterally, distinct on anterior two-fifths of pronotum; lateral prominences laminar, only weakly diverging, directed at point on anterior pronotal margin midway between anterior angle and postocular emargination; lateral carina distinct; apices of pronotal prominences slightly overhanging anterior margin (lateral view); anterolateral pronotal angles with point made salient by shallow emargination of lateral margin, lateral margin obtusely angulate at anterior apex of lateral carina; posterior angles rounded; anterior margin without medial point or angle; midline impressed slightly more than basal one-half of pronotum; evenly densely punctate, punctures simple, contiguous to separated by about their widths except on anterior one-fifth between medial and lateral prominences where puncturation is reduced, punctures separated by up to 3 × their widths, within posterior submarginal impression punctures slightly more coarse, annular. ELYTRA with eighth and tenth striae complete, ninth stria arising at about basal one-third of elytron; striae crenate-punctate, punctures separated by 1–2 × their widths on disc; intervals weakly convex, very sparsely minutely punctulate. PYGIDIUM with engraved submarginal line complete, disc deeply punctate, punctures moderate, mostly separated by less than their widths. VENTER with small rectangular tooth on anterior margin of prosternite medially, tooth slightly longer than wide. Proepisternites sericeous, distinctly more strongly microsculptured than proepimera, laterally with punctures less than one-half size of those on proepimera. Metasternum weakly punctate along medial margins of middle coxae; disc impunctate. Sixth abdominal sternite at middle slightly longer than combined lengths of sternites four and five. LEGS moderately punctate on apical one-third of middle and hind femora; anterior tibial spur in

apical third ventrally curving, tapering to sharp point; middle and hind tarsi broadly expanded, middle three segments each broader than long. GENITALIA with parameres blunt (lateral view), similar to those of *Copris lecontei* Matthews.

Female.—(Allotype) length 13.0 mm; width 7.5 mm, 6.5 at humeri. Similar to male except: Cephalic horn about twice broader than long (anterior view), with apex shallowly emarginate; apex elliptical (dorsal view), weakly concave, deeply densely punctate, about 3 × maximum dorsal eye width; pronotal armament with transverse biarcuate carina in medial third above vertical declivity to anterior margin, low subconical tumosity at each side of carina at about lateral one-fifths of pronotum; lateral carina distinct; strial punctures of elytra mostly separated by one-half their widths; sixth abdominal segment at middle equalling length of segments two to five. Anterior tibial spur curving ventrally in apical one-fourth.

Diagnosis.—*Copris macclevei* can be distinguished by the following combination of characters: middle and hind tarsi broadly expanded, with middle three segments broader than long; anterior margin of prosternum medially with narrow truncated tooth; clypeal disc with punctures obsolete; proepisternites with distinctly stronger microsculpture and smaller punctures than proepimera; lateral pronotal carina distinct; anterior pronotal angles made salient by shallow emargination of lateral margin; pygidium apically with engraved submarginal line complete.

Variation.—Length 9.0–14.0 mm; width 4.5–8.0 mm. Smallest males have the cephalic horn reduced to a low, transversely carinate tumosity, and lack all vestiges of the lateral pronotal prominences. The median pronotal prominences in these males are reduced to a vaguely indicated, anteriorly bifurcate swelling, anteriorly separated by a broad but shallow depression. Occasional "major" males lack apical expansion of the cephalic horn. Smallest females have the cephalic horn reduced to a low, transverse tumosity that is flat-topped rather than carinate. The pronotal armature is weakly indicated but similar to that of "major" females. Worn specimens may exhibit an apically rounded cephalic horn, and the apical width of this horn varies from approximately five- to nine-halves as wide as a maximum dorsal eye width.

Relationships.—*Copris macclevei* is in the *C. rebouchei* complex as defined by Matthews (1962), and can be keyed to *Copris lecontei* Matthews in that paper. However, the broadly expanded middle and hind tarsal segments, truncated narrow tooth on the anterior prosternal margin, smaller eyes, and nearly impunctate clypeofrontal disc of *C. macclevei* quickly differentiate it from *C. lecontei* (see Figs. 1–6 for comparisons).

Etymology.—This species is named for Scott McCleve, collector of much of the type series.

Biology.—I have not been able to capture this species in pitfall traps baited with human or cow feces, or carrion, nor have I been able to find it in/under cow dung pats during numerous collecting trips through suitable habitats. Most early specimens examined for which ecological data were available were collected at white or ultraviolet lights. The majority of these specimens were collected in July within a few days after the first heavy summer rains with occasional specimens being collected during the monsoons thereafter. These data suggested an inquiline relationship. Such "rain triggered" emergence occurs for the majority of summer active Scarabaeidae in the southwestern U.S., with inquiline species' peak activity normally occurring a day (or night) or two after the first heavy rain. Most non-inqiline, rain triggered species normally begin flying after the same rains, but peak

in activity a week or two later. Three rodent-inquiline Scarabaeinae sympatric with *C. macclevei, Copris arizonensis* Schaeffer (see below), *Onthophagus browni* Howden and Cartwright, and *Onthophagus velutinus* Horn have similar patterns of collection.

Hallfter & Matthews (1966) report a record of *C. "lecontei"* collected from a *Neotoma* sp. (packrat) nest by H. Howden in northeastern Mexico. Suspecting that this record actually pertained to *C. macclevei,* I obtained the specimen involved and found that was indeed *C. macclevei.* Howden also collected a specimen partially emerged from a brood ball in a *Neotoma* nest near Portal, Arizona. The brood ball had apparently been constructed from woodrat feces, and had a thick covering of soil (a brood cell wall?). Apprised of the probable inquiline relationship, J. S. Hunter III, subsequently excavated numerous specimens from *Neotoma* nests in Green Valley, Arizona. None of several old brood balls found in the process had a soil covering. *Copris macclevei* is probably an obligate rodent inquiline. *Copris lecontei* is commonly found in cow dung (see below) and has not been recorded from *Neotoma* nests.

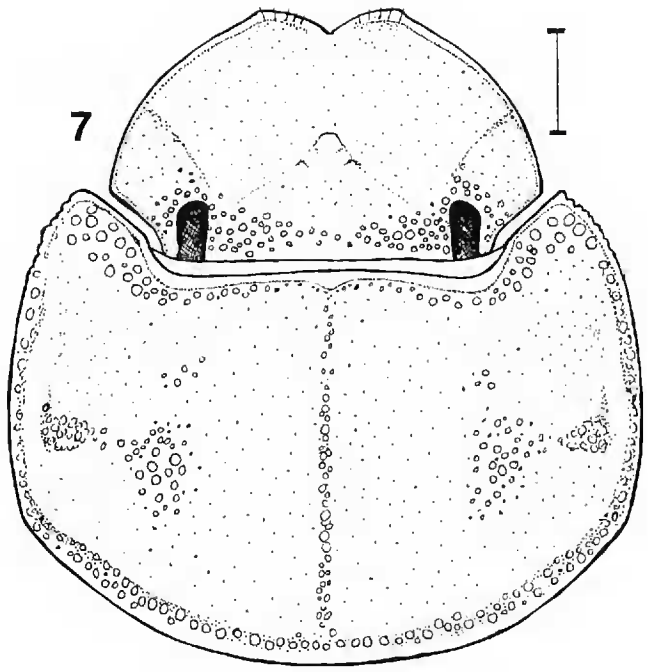
Most records of *C. macclevei* are from localities in desert or desert grassland habitats, slightly lower in elevation than those recorded for *C. arizonensis,* although the two are essentially sympatric along juniper or oak woodland/desert or desert grassland ecotone.

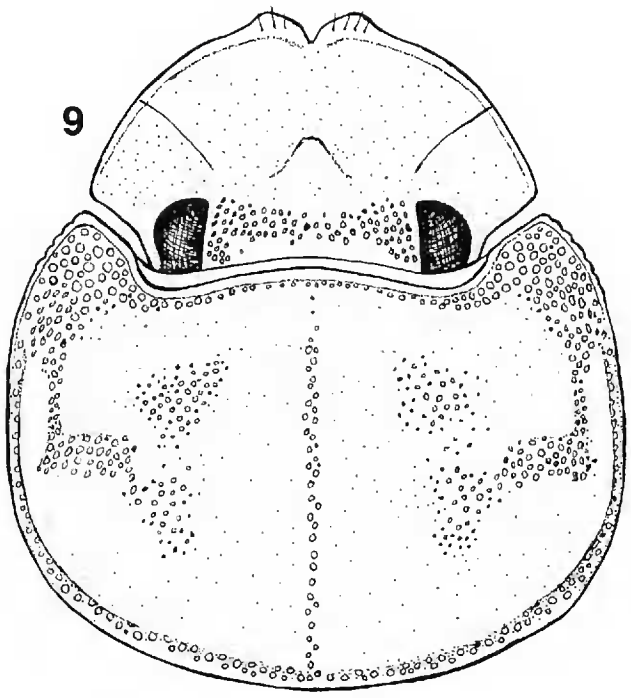
Remarks.—Matthews (1962) apparently confused *C. macclevei* with *C. lecontei,* as part of the above paratype series is labelled with his 1961 *C. lecontei* determination labels. Most, if not all of his published Gila and Yavapai County, Arizona, records for *C. lecontei* represent *C. macclevei.* I have seen no specimens of *C. lecontei* from that far north, all *C. "lecontei"* examined from those counties being *macclevei.*

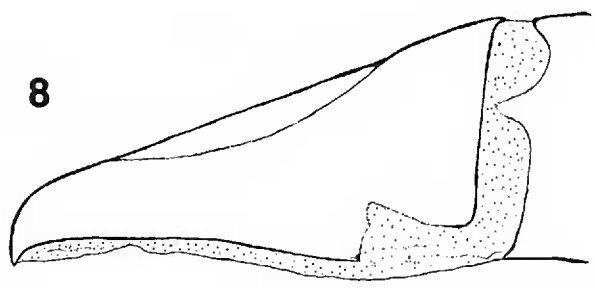
Copris igualensis Warner, NEW SPECIES
Figs. 7 and 8

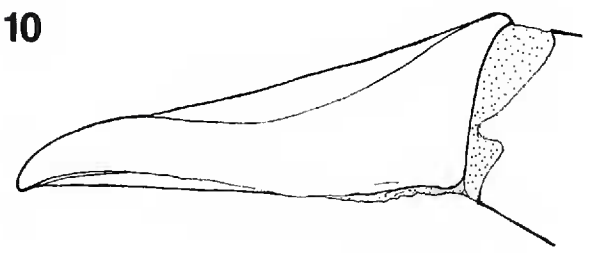
Types.—Holotype male. Data: "Mexico: Guerrero, 6 mi. NW Iguala, viii-2-1981, at light, P. Jump"; deposited in the Florida State Collection of Arthropods, Gainesville. Paratype, male, data same as holotype; in private collection of S. McCleve.

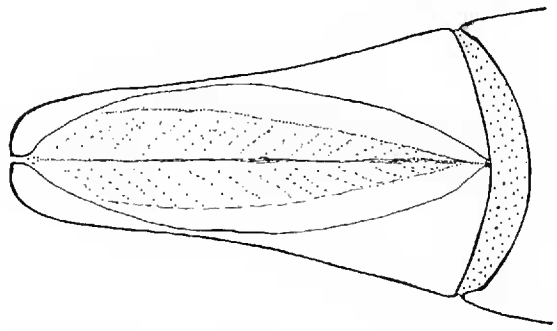
Description.—Male (holotype). Length 12.0 mm; width 6.5 mm widest, 5.5 mm at humeri. HEAD armed with low subconical process at medioposterior clypeal margin, process densely minutely punctate, posteriorly flattened, with tiny but apparent tubercle posterior to base at each side, distance between tubercles and apex of process about equal to diameter of tubercle, tubercles and apex of process thus forming tiny equilateral triangle, process from lateral view reflexed above frontal plane. Clypeus bidentate, teeth low, very broad and obtuse, medial notch obsolete. Posterior genal angles obtuse. Majority of upper surface of head very sparsely minutely punctate (appearing impunctate) except for dense transverse interocular band of coarse umbilical punctures which continues narrower (but uninterrupted) around eyes to posterior genal margins. Posterior oblique carina obsolescent, but indicated; transverse occipital carina and setigerous transverse occipital groove complete. Eyes small, narrow, less than one-sixth as wide as dorsal interocular width. PRONOTUM unarmed, anterolateral angles subquadrate; lateral margin evenly weakly convex, without angulations, irregularly serrate or crenulate anterior to medial portion of anterior pronotal margin; anterior margin medially with small obtuse angulation pointing posteriorly into nearly entire impressed medial longitudinal sulcus; pronotum finely sparsely punctate as in head except following areas coarsely umbilically punctate as in interocular band: medial longitudinal sulcus with mostly single line of mostly contiguous punctures, along entire submargin with more or less continuous band one to two punctures wide except for

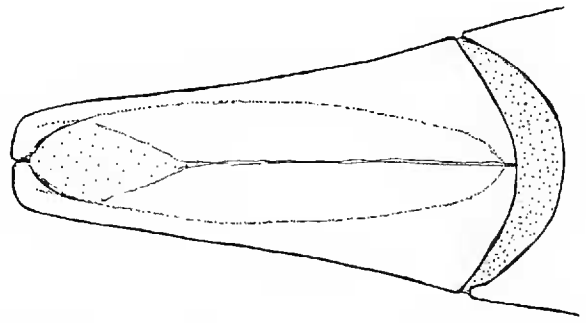












Figures 7–10. Figure 7. *Copris igualensis,* holotype, head and pronotum (dorsal view). Figure 8. *Copris igualensis,* holotype, parameres (lateral and dorsal views). Figure 9. *Copris laeviceps,* head and pronotum (dorsal view). Figure 10. *Copris laeviceps,* parameres (lateral and dorsal views). Scale lines 1 mm; Figures 7 and 9 drawn to same scale.

anterolateral angles where three to four punctures wide, in lateral fossa and in oval patch narrowly connected to fossa by a few punctures, patch with anterior edge at about transverse pronotal midline and medial edge at lateral longitudinal one-third, with small more or less discrete group of two to six punctures just anterior to anteromedial edge of patch. ELYTRA with eighth stria arising near base, disintegrating halfway down elytron, resuming intact behind posterior umbone; ninth stria disintegrating just anterior to midlength of elytron, obsolete in anterior one-third, close to but not arising from complete tenth stria; striae coarsely umbilically punctured, punctures round, mostly separated by slightly more than their diameters, interstriae weakly convex, sparsely minutely punctured as in head and pronotum. PYGIDIUM coarsely densely punctate, punctures contiguous to (mostly) separated by about their diameters; pygidial margin obsolescent medially. VENTER with wide low elevation on anterior prosternal margin medially. Medial third of metasternite completely impunctate except for single indistinct puncture at each side just behind anterior margin; lateral one-thirds punctured similarly to pygidial disc. Abdominal sternites basally each with single row of punctures, row expanding to full segment length near lateral margins. LEGS: posterior trochanters without ventral setal tufts.

Femora sparsely minutely punctate as in elytral interstriae. Anterior tibiae sparsely punctate in ventral one-half, punctures similar in size to coarse cephalic punctures but not umbilical, separated by 1–4 × their diameters; anterior tibial spurs straight (anterior view), blunt, curving posteriorly in apical half; middle and posterior tibiae impunctate; posterior tibiae apically with three supplementary setae on posterior face and one distal setal tuft on anterior face. Male genitalia as in Fig. 8.

Diagnosis.—*Copris igualensis* can be distinguished by the following character combinations: eyes one-sixth or less as wide as dorsal interocular width; metasternite with anteromedial one-third impunctate; posterior trochanters without setal tufts; lateral pronotal carina obsolete.

Variation.—The paratype male is slightly smaller (11.5 by 6.5 mm; 5.5 mm wide at elytral humeri) but otherwise differs little from the holotype.

Relationships.—*Copris igualensis* is in the *C. incertus* complex as defined by Matthews (1962) and keys to *Copris laeviceps* Harold in that paper. This species indeed looks very similar to *C. laeviceps* in general appearance and size; however, *C. laeviceps* has much larger eyes (about one-fourth or less of dorsal interocular width), narrower clypeal teeth, cephalic (coarse) puncturation limited to an interocular band, a more extensively punctured pronotum, less apically "hooked" parameres, and has the anteromedial third of the metasternite submarginally punctate (see Figs. 7–10 for comparisons). Should the two males examined turn out to be poorly developed individuals of a normally horned species, the small eyes, lack of setal tufts on the posterior trochanters, and obsolete lateral pronotal carina should distinguish *C. igualensis* from all other New World *Copris*.

Etymology.—This species is named for the type locality.

Biology.—Both specimens examined were collected at light. The rarity of this species in collections is indicative of an unusual (possibly inquiline) life history.

Copris mexicanus Matthews & Halffter

Because the female of *C. mexicanus* has not been described, I do so here:

Description.—*Female:* length 15.5 mm; width 8.5 mm widest, 7.0 mm at humeri. Similar to male except: clypeal teeth and medial notch more pronounced, gular angle nearly right. PRONOTUM impunctate in basomedial one-third, elsewhere nearly contiguously punctate, punctures subumbilical, effaced posteriorly, becoming smaller towards basomedial impunctate area, in middle one-third arranged in more or less discernable parallel arcs behind and following contour of anterior pronotal prominence, anterior prominence abruptly rising from anterior margin; submargin between lateral carinae impressed and filled with annular punctures, medial pronotal line deeply impressed, impunctate, extending from base to slightly more than midpoint of disc.

Only four specimens of this rare species, all males, have been recorded in the literature. I have examined two large ("major") males and a female supplied by Ron McPeak, all labeled: MEXICO. *MICHOACAN.* Uruapan, 8–9 Jul 1972, R. H. McPeak. Both males are slightly larger than the specimens examined by Matthews (1962) and have more pronounced cephalic and pronotal armature (one of the two has the head horn bent at nearly a 90° angle), but otherwise differ little from his redescription. A third male, similar in size and appearance to the specimen in Matthews' (1962) figures, was received from T. Taylor, and is labelled: MEXICO. *MICHOACAN.* El Laureles, 17 Jul 1988. A diagnostic character not emphasized in Matthews' (1962) monograph is the evenly, rather deeply impressed elytral striae, and the fine, very transverse strial punctures which at most only slightly crenate the edges of the channel. Most related species have larger, less

transverse strial punctures which distinctly crenate the margins of the strial channel.

Copris arizonensis Schaeffer

This species has been collected in woodrat (*Neotoma* sp.) nests by H. Howden (Halffter & Matthews 1966). During the summer of 1979, I found old brood balls and parts of dead adult *C. arizonensis* during excavations of woodrat nests in the Chiricahua foothills (juniper woodland) near Portal, Arizona, but not in the flats (desert grassland) below. The brood balls appeared to be constructed entirely from woodrat feces (i.e., without a soil covering) and were open on one side (an emergence hole). Surprisingly little of the balls had been consumed. In southern Arizona, *C. arizonensis* are attracted to lights the first night or two after the first heavy summer rains, and are occasionally captured at light following subsequent summer rains.

Copris lecontei Matthews
Figs. 4–6

Matthews (1962) gives no information on the biology of this species. I have trapped adults using human and cow dung baits, excavated numerous adults from burrows beneath cow pats in southeastern Arizona, and collected a male-female pair crawling on dog feces in Portal, Arizona. It has been taken in moderate numbers at UV and white lights. Also near Portal, in late July at 07:00 h I observed a male *C. lecontei* pulling pieces of cow dung from beneath a day-old pat and dragging them backwards into a burrow beneath the edge of the pat. The beetle grasped and carried the dung in its front legs. Excavation of the burrow yielded a female *C. lecontei* and partially completed dung cake at the bottom.

Acknowledgment

I thank the following individuals and institutions that loaned specimens: D. Kavanaugh, California Academy of Sciences; E. L. Sleeper, California State University at Long Beach; the late F. F. Hasbrouck, Arizona State University; F. Werner, University of Arizona; J. May, Arizona Department of Agriculture and Horticulture; C. McGiffen, Illinois Natural History Survey; R. D. Gordon, U. S. National Museum of Natural History; R. Woodruff, P. Skelley, Florida State Collection of Arthropods; and R. Aalbu, R. Cunningham, R. W. Duff, A. V. Evans, J. S. Hunter III, S. McCleve, R. McPeak, H. F. Howden, and T. Taylor. Robert D. Gordon, Systematic Entomology Laboratory, USDA, kindly allowed me to examine the holotype of *Copris lecontei* Matthews, and A. V. Evans, R. D. Gordon, G. Halffter, H. F. Howden, J. S. Hunter III, S. McCleve, and B. C. Ratcliffe reviewed various drafts of the manuscript.

Literature Cited

Halffter, G. & E. G. Matthews. 1966. The natural history of dung beetles of the subfamily Scarabaeinae (Coleoptera, Scarabaeidae). Folia Entomol. Mex., 12–14: 1–312.

Howden, H. F. & O. P. Young. 1983. Panamanian Scarabaeinae: taxonomy, distribution, and habits (Coleoptera, Scarabaeidae). Cont. Amer. Entomol. Inst., 18.

Matthews, E. G. 1962. A revision of the genus *Copris* Muller of the Western Hemisphere (Coleoptera: Scarabaeidae). Entomol. Amer., 41: 1–139.

Matthews, E. G. & G. Halffter. 1968. New data on American *Copris* with discussion of a fossil species (Coleoptera: Scarabaeidae). Ciencia, Mexico, 26(4): 147–162.

Torre-Bueno, J. R. de la. 1978. A glossary of entomology. New York Entomological Society, New York.

Received 7 March 1990; accepted 4 September 1990.